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THE TREATMENT WITH AUREOMYCIN OF ACUTE BOVINE STAPHYLOCOCCAL MASTITIS

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During 1949 a small amount of aureomycin, a new antibiotic, was made available for experimental use by the courtesy of the Lederle Laboratories, American Cyanamid Co., New York. The antibiotic was dispensed in collapsible tubes for udder infusion and it was decided to test its efficacy on various clinical and sub-clinical conditions in the bovine udder, in particular those conditions which were not generally responsive to penicillin therapy. This study records experiments which have been made in the field in an attempt to control acute staphylococcal infections in the bovine udder.

McCulloch, E. C., Kiser, J. S., and Migaki, H. (1949), first reported the use of aureomycin in staphylococcal mastitis. They treated 61 infected quarters in 16 cows, the aureomycin being infused in saline suspension or in an oily base in collapsible tubes. They found that the most satisfactory result was obtained by the injection of 200 mg. aureomycin in oil, repeating the dose after 72 hours; the results were assessed after 21 days when 12 out of 14 quarters were cured. Easterbrooks, H. L. (1950), reported on the effect of intravenous injection of aureomycin in the treatment of one case of acute staphylococcal mastitis following injury to the quarter. A considerable quantity of aureomycin was expended before resolution was complete. Packer, R. A. (1950), claimed the successful treatment of about one-third of 70 infected quarters after a single 200 mg. dose of aureomycin and infection was eliminated from two-thirds after two injections.

Method of Examination and Treatment

Cases of acute mastitis were reported by veterinary practitioners in the neighbourhood of the laboratory and treatment with aureomycin was begun as soon as possible. In the earlier cases, treatment was sometimes delayed for several days because the practitioner did not know that aureomycin was available for experimental use and attempts had been made to control the infection with other agents, such as penicillin, streptomycin and dibromopropamidine, before aureomycin therapy was attempted. Diagnosis of infection was based on the isolation on sheep's blood agar plates of haemolytic staphylococci; the reaction to the slide coagulase test and the degree of haemolysin production were taken as the criteria for pathogenicity.

Aureomycin hydrochloride, incorporated in an ointment base, was dispensed in collapsible tubes. Each tube contained approximately 200 mg. aureomycin hydrochloride in 75 grammes ointment. In the earlier cases an initial injection of one tube of aureomycin was made, followed by two further injections at an interval of 48 hours each. Experience showed that in very severe infections an initial dose of two tubes was beneficial, with a second double dose after 48 hours and further injections, if required, as indicated by the progress of the patient. In the exceptionally severe cases, 8 and 10, this double injection was repeated 24 hours after the initial dose.

Clinical Symptoms

Ten cases of acute staphylococcal mastitis were examined. In the majority the clinical symptoms were very similar. Acute mastitis was observed in one or more quarters a few days after calving and the onset was very rapid. The cow showed marked depression, loss of appetite, a diminution of the milk yield and a high temperature, although the latter was not a constant symptom. The affected quarter became very enlarged, hot and tense and generally painful. The secretion was small in amount, odourless, clear yellow and serum-like with a small number of blood-stained flocculent clots which deposited in the sample bottle. After the commencement of aureomycin treatment it underwent a change and became thick and clotted with an appearance not unlike scrambled egg. Small blood clots were seen in this discharge. Aureomycin imparted a bright yellow colour to the secretion which persisted for some days after injection was completed. In those cases in which resolution of the quarter eventually took place the secretion became thin, watery and of a dirty white colour with a few slimy clots suspended in it before it returned to normal consistency.

Results of Treatment

Treatment results are summarised in Table I (*over-leaf*) and a brief description of the individual cases may be given.

Cow 1 G/S was a second calf Friesian. Mastitis developed in both hind quarters two days after calving, but aureomycin was not injected until ten days after infection was observed. The cow was extremely ill at this time and a slow recovery began to be apparent after the second injection. The right hind quarter eventually ruptured and *C. pyogenes* invaded the tissues; the opposite quarter became normal 30 days after the initial aureomycin injection and the milk secretion was normal in appearance, although reduced in amount.

Cow 2 A/I was a second calf Shorthorn. Mastitis developed in both left quarters on the day prior to calving and penicillin therapy had been carried out in all quarters for ten days after the onset of infection. Aureomycin was injected into both affected quarters on the tenth day and slight improvement in the general condition of the cow was observed on the following day. Three further injections in each quarter were made and on the 16th day after the beginning of aureomycin treatment the condition of the cow was normal and a decrease in size of the affected quarters was seen. On the 21st day the left fore quarter was normal and bacteriologically sterile; the left hind quarter ceased to function.

Cow 3 M/R was a fourth calf Ayrshire. Acute mastitis developed in the left hind quarter on the sixth day after calving. Penicillin had been administered by intramammary and intramuscular routes for five days prior to aureo-

mycin treatment. An improvement in the general condition of the cow was seen after the first injection. Three injections of aureomycin were given at intervals of 48 hours and the improvement in condition was maintained. Thirteen days after the beginning of treatment the secretion from the quarter was normal and free from haemolytic staphylococci. An area of induration persisted in the quarter for some weeks after recovery and the milk yield from that quarter was decreased in amount.

Cow 4 F/M was a cross-bred second calf Shorthorn. Acute mastitis developed in both right quarters 17 days after calving. Penicillin had been injected for three days

TABLE I

RESULTS OF TREATMENT

Cow number and breed	Quarter	Clinical condition of quarter	Aureomycin injected per quarter		Post-treatment condition			
			Date	Dose mg.	Days after	Bacteriological	Quarter	Milk
1 G/S, Friesian	RH	3 +	20.7 22.7	200 "	30	*C. pyogenes*	Not functioning	Nil
	LH	2 +	25.7 29.7	" "	30	Negative	Normal	Normal
2 A/I, Shorthorn	LF	2 +	28.7 30.7	200 "	21	Negative	Normal	Normal
	LH	3 +	1.8 9.8	" "	21	2 + H	Not functioning	Watery
3 M/R, Ayrshire	LH	3 +	26.8 28.8 30.8	200 " "	16	Negative	Induration	Normal
4 F/M, Shorthorn	RF	2 +	28.11 29.11	200 "	21	Negative	Induration	Watery
	RH	3 + gangrene	30.11 1.12 2.12	" " "	21	3 + H	Sloughing	Nil
5 S/K, Red Poll	RH	3 +	28.10 30.10 1.11	400 200 "	20	Negative	Induration	Normal
6 B/K, Shorthorn	RH	3 +	8.11 10.11 12.11	400 " 200	30	2 + P	Induration	Clotted; pink
7 S/A, Ayrshire	LF	2 +	20.11 22.11 24.11	400 " 200	31	Negative	Induration	Clotted
8 M/V, Guernsey	LF	3 +	27.11 28.11	400 "	30	2 + P	Induration	Clotted; orange
	LH	2 +	1.12 4.12	200 " (LF)	30	Negative	Normal	Normal
9 C/C, Friesian	RF	3 +	5.1 6.1 7.1 9.1	400 200 " 400	7	3 + P	Indurated; enlarged	Clotted; blood clots
10 D/L, Shorthorn	LH	3 +	10.2 11.2 12.2 14.2 15.2 16.2 17.2 18.2 19.2	400 " " " " 200 " " "	16	3 + P	Indurated; normal size	Few clots; slightly watery

Key:—

Clinical condition of quarter:

3 + = Quarter very hard and tense; painful; gross changes in appearance of secretion from quarter. Generally associated with marked systemic disturbance.

2 + = Clinical symptoms not as severe; changes in milk appearance may be similar to those occurring in the 3 + condition.

Bacteriological condition after treatment:

2 + = 50 to 200 staphylococci per 0·1 ml. secretion.

3 + = Over 200. " " "

H = Haemolytic.

P = Partially haemolytic.

prior to aureomycin treatment. At the first examination gangrene was observed in the right hind quarter and it appeared to be unlikely that aureomycin would be of any benefit in this instance. Daily injections of aureomycin were made into each affected quarter for five days. After 21 days the gangrenous hind quarter began to slough off and this was completed in 20 days. Two weeks after the beginning of treatment, non-haemolytic staphylococci were isolated from the front quarter and the secretion had changed from a thick, clotted consistency to yellow and watery. At the final examination of the cow two and a half months after treatment the area of sloughing had completely healed and normal milk, reduced in amount, was being secreted from the front quarter.

Cow 5 S/K was a third calf Red Poll. Blood-tinged milk was observed in the right hind quarter on the day after calving and acute mastitis developed in that quarter two days later. Previous treatment had consisted of 1,000,000 units penicillin intramuscularly, propamidine, penicillin and streptomycin injected via the teat duct into the quarter. Two tubes of aureomycin were injected on the third day after calving, sulphamezathine (33⅓ per cent., 15 c.c. per cwt.) was given intravenously and 1,000,000 units of penicillin were injected into the substance of the affected quarter. This latter treatment was recommended and carried out by Mr. H. A. Crawshaw, F.R.C.V.S., of Guildford, together with the administration of the sulphamezathine. Similar treatment was repeated on the two following days and a final tube of aureomycin was given on the fourth day after the beginning of treatment. After 20 days the quarter had become normal in size and two large areas of induration could be palpated in the substance of it. The milk, which was free from staphylococci, showed a pink tinge in the cream layer on standing. The secretion was reduced in amount, but eventually it became normal in appearance.

Cow 6 B/K was a first calf Shorthorn heifer. Acute mastitis was observed in the right hind quarter nine days after calving and 100,000 units penicillin had already been injected into the quarter. Two tubes of aureomycin and 100 c.c. sulphamezathine intravenously were injected on the eighth day. After 48 hours there was a marked improvement in the condition of the heifer when the treatment was repeated. A single tube of aureomycin was given after a further 48 hours. The quarter continued to decrease in size until after six weeks it was of normal size but very indurated throughout. The secretion consisted of a few ounces of watery material containing slimy clots; partially haemolytic, coagulase-positive staphylococci were isolated from the secretion.

Cow 7 S/A was a third calf Ayrshire. A few small clots were seen in the fore-milk of the left fore quarter on the day after calving, when penicillin was injected. On the fourth day after calving acute mastitis was present in this quarter and two tubes of aureomycin were injected. After 48 hours the cow was normal in condition and feeding well. The enlarged quarter had decreased in size, pain was now absent and it was softer in texture; two more tubes were injected on this day and one further single injection was made 48 hours later. One week after the beginning of treatment the total milk yield had returned to 3 gallons per day and the animal was normal in every respect with the exception of the affected quarter. As in Cow 6 above, one month after treatment the quarter had diminished in size but it remained indurated with abnormal secretion, which was sterile on bacteriological examination.

Cow 8 M/V was a third calf Guernsey. Acute mastitis was seen in the left fore quarter on the day after calving, when sulphanilamide per os and intramammary injections of penicillin and dibromopropamidine were given. On the following day the left hind quarter was also affected. Two tubes of aureomycin were injected into each quarter combined with an intramuscular injection of 1,000,000 units of penicillin and sulphamezathine per os. This treatment was repeated on the following day when a slight decrease in size and a softening of both quarters was observed. Single injections of aureomycin into each quarter were repeated on the fourth day after the beginning of treatment and again in the front quarter on the seventh day. By this time the hind quarter had become normal in size and it was secreting pale yellow milk containing a few clots. The secretion from the front quarter was serum-like and the quarter remained hard to the touch. One month after calving the hind quarter was entirely normal with normal milk secretion; the fore quarter remained indurated with a small quantity of serum-like secretion; haemolytic, coagulase-positive staphylococci were isolated from this secretion.

Cow 9 C/C was a third calf Friesian. Acute mastitis was first observed in the right fore quarter six days after calving. Penicillin had already been given and two tubes of aureomycin were given 24 hours later with 100 c.c. sulphamezathine intravenously. Single doses of aureomycin were repeated at 24 and 48 hours and a double injection was given at the 96th hour. One week after the commencement of treatment the condition of the cow had improved and there was some diminution in the size of the affected quarter. The secretion was grossly abnormal and haemolytic, coagulase-positive staphylococci were isolated therefrom.

Cow 10 D/L was a fourth calf Shorthorn. Acute mastitis developed in the left hind quarter 48 hours after calving, when penicillin was administered. On the following day two tubes of aureomycin and 50 c.c. sulphamezathine intravenously were given. After 24 hours the general appearance of the cow was improved, although no change could be observed in the affected quarter and two more tubes of aureomycin were injected. This treatment, together with sulphamezathine intravenously, was repeated on the following day. Treatment with aureomycin continued on similar lines until the sixth day after initial treatment, when a total of eleven tubes of aureomycin had been injected. At this stage improvement in the quarter was not being maintained and treatment was continued by the use of daily injections of one tube of dibromopropamidine in the morning and one tube of aureomycin each night for a further three days. The quarter was thoroughly stripped before injection on each occasion. A total of 14 tubes of aureomycin had now been given and there was a considerable improvement in the condition of the quarter. The swelling had decreased and the secretion was almost normal in appearance; it contained a few clots and it was slightly discoloured. Feebly haemolytic, coagulase-positive staphylococci were isolated in large numbers from the secretion.

Discussion

It would appear to be necessary to begin aureomycin treatment of the affected quarter at the earliest possible moment and therefore recognition of the condition in its early stages is of prime importance. This is well illustrated in the case of Cow 8 (M/V), in which the onset of clinical changes in the left hind quarter was observed within the first few hours of infection. The prompt administration

of aureomycin brought about a return to the normal condition of the quarter after one week. McCulloch *et al.* (1949) reported that aureomycin levels in post-treatment milk samples showed inhibitory concentrations after 48 and even 72 hours and it would seem, therefore, that a 48-hour interval of administration would be sufficient to maintain a satisfactory inhibitory level in the quarter. In the earlier cases single 200 mg. doses were given with an interval of 48 hours between each dose. This dosage was thought to be insufficient and later an initial double dose of aureomycin was used and the interval of administration was reduced from 48 to 24 hours in some instances. From the results obtained it is difficult to form an opinion whether this procedure is of benefit. It is thought, however, that the thick, catarrhal secretion so frequently associated with acute staphylococcal mastitis may act as a barrier to the diffusion of the aureomycin from the site of injection in the teat canal. In the last case reported, Cow 10, injections were made of dibromopropamidine, followed later in the day by aureomycin. This involved more frequent stripping of the quarter and the combination of both aureomycin, propamidine and stripping appeared to have a beneficial effect.

Aureomycin appears to have a bacteriostatic effect upon staphylococci in acute mastitis. In several instances staphylococci were isolated in large numbers from the quarter secretion even when the clinical symptoms were beginning to diminish in severity. It was observed, however, that the haemolytic properties of the organism had diminished; some strains became non-haemolytic and coagulase-negative, others became feebly haemolytic while remaining coagulase-positive. In these cases it was not established whether the strain isolated after treatment was, indeed, the original causal organism or whether re-infection of the quarter had taken place by an extraneous non-haemolytic type. It would be reasonable to assume, however, that the strain isolated after treatment was a modification of the original infecting organism.

A total of 14 infected quarters in ten cows were treated with aureomycin alone, or in conjunction with other substances, such as penicillin, sulphamezathine and/or dibromopropamidine. In all cases the general condition of the cow improved rapidly after the administration of aureomycin and the animal returned to normal health after seven days or earlier in some instances. It will be observed from Table II that half of all treated quarters were eventually restored to a near-normal condition; areas of induration were, however, usually discernible in the affected quarter and the milk yield was reduced in amount. It is possible that these quarters may be restored to their normal function during the next lactation. Of the 14 quarters treated, eight received aureomycin alone and four recovered. The remaining infected quarters received treatment supplementary to aureomycin and again half of the treated quarters recovered (Table II).

Table II

Comparison of Methods of Treatment

Method	Quarters treated	Quarters cured
Aureomycin alone	8	4
Aureomycin + Penicillin into tissue of quarter + Sulphamezathine i/v	1	1
Aureomycin + Sulphamezathine i/v	4	1
Aureomycin + dibromopropamidine + Sulphamezathine i/v	1	1
Total	14	7

Aureomycin appears, therefore, to be of definite value in the treatment of acute mastitis caused by haemolytic staphylococci. The affected animal is restored to normal health in a comparatively short time and the spread of infection in the affected quarter is arrested. Early diagnosis and treatment is highly desirable, although some quarters have been restored to a normal condition after prolonged infection. The combination of aureomycin with sulphamezathine or dibromopropamidine appears to be of some value.

Summary

(1) The treatment of ten cows affected in 14 quarters with acute haemolytic staphylococcal mastitis is reported.

(2) Half of all affected quarters were restored to a "near" normal condition after treatment with aureomycin alone or in conjunction with penicillin, sulphamezathine or dibromopropamidine.

Acknowledgments.—The writer wishes to express his thanks and appreciation to the following veterinary surgeons for their co-operation in the treatment of the above cases: Messrs. E. P. Barrett and H. A. Crawshaw, of Guildford; Mr. D. F. V. Balls, of Dorking; Mr. G. E. Joss, of Redhill; Mr. F. P. E. Rickard, of Woking; also to his assistant, Miss E. F. Peake, for her help and industry in the field and laboratory work involved.

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CROP PROTECTION PRODUCTS APPROVAL SCHEME

In 1942 the Secretary of State for Scotland and the Minister of Agriculture and Fisheries, acting in consultation with the Agricultural Research Council, appointed a Committee of English and Scottish scientists to advise on applications from manufacturers for the approval of proprietary products for the control of plant pests and diseases. Most of the important groups of insecticides and fungicides have been considered and nearly 400 products have been officially approved and are now available on the market. A full list of approved products is published in January of each year, and the names of products added between successive issues of the full lists are published in "Scottish Agriculture," the quarterly journal of the Department of Agriculture for Scotland, and in "Agriculture," the monthly journal of the Ministry of Agriculture and Fisheries. In 1950 the scheme was extended to include herbicides and it was renamed the Crop Protection Products Approval Scheme. Particulars of the scheme may be obtained on application to the Plant Pathology Laboratory, Milton Road, Harpenden, Herts.

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NATIONAL COUNCIL FOR DOMESTIC FOOD PRODUCTION

The Minister of Agriculture and Fisheries has appointed Mr. A. J. Champion, M.P., Parliamentary Secretary to the Ministry, to be Chairman of the National Council for Domestic Food Production in succession to Mr. G. A. Brown, M.P.

Lord Macpherson and Mr. W. Powell-Owen, representing the Domestic Poultry Keepers' Council, and Mr. J. C. Sandford, representing the British Rabbit Council, have been appointed to be members of the National Council.

SUMMARIES OF PAPERS PRESENTED TO THE ASSOCIATION OF VETERINARY TEACHERS AND RESEARCH WORKERS*

Studies in the Behaviour of Domestic Cattle

1. Skin Hygiene. 2. Curiosity. 3. Play

(A. Brownlee, Agricultural Research Council Field Station, Compton, Berkshire)

Skin Hygiene.—There is an instinct which induces the animal to bring cutaneous sensory organs into frictional contact with valent objects within the environment. These objects are: (*a*) the animal's own tongue, horn, or hind foot; (*b*) the tongue of congeners; (*c*) tree trunks, gates, etc.; (*d*) a conditioned object is the hand or the grooming brush of an attendant. A condition of itch mediates between the drive and the releasers. The releasers are certain contaminating agents on or in the skin. The more powerful the releaser the less potent need be the drive and *vice versa*. An apparently pleasurably toned sensation accompanies the conation.

Poor diet, inclement weather, illness, fear, pain and curiosity inhibit the drive to some degree. The drive appears to be accentuated soon after feeding.

Curiosity.—This is the instinct which induces the animal to bring the sense organs of sight, touch, hearing, smell and taste into functional relationship with unexplored items in the environment which act as releasers to the drive. Hence curiosity is most active in the young to which the environment is as yet new. With an increasing acquaintance with the environment the releaser component tends to die down. However, the drive is not extinguished and a strange object introduced will act as a releaser even in an adult animal.

Poor diet, inclement weather, illness and fear inhibit the instinct to some extent.

Play.—Play is the conative component of an instinct which induces the animal to bring those kinaesthetic organs, which are not usually exercised in the day-to-day routine of the animal's life, into functional relationship with the terrain, with congeners and with valent movable inanimate objects. Thus in play we observe trotting, galloping, tail elevation, bucking, kicking, head shaking, snorting, head play with congeners or with water buckets and wheelbarrows, etc., and mounting of congeners by immature animals. That emotion accompanies play is indicated by a change of voice; that it is pleasurably toned is indicated by the oft repeating of apparently spontaneous movements.

The play drive is favoured by good feeding and good weather and is further accentuated by pleasurable sensation as on relief from boredom—as, for example, by arrival of attendants or of other animals, soon after feeding (*cf.*, skin hygiene), after having itch relieved, and during oestrus when head play often is observed. It is inhibited by fear or illness.

Play is released by a new and therefore kinaesthetically unexplored environment and thus is observed most in the young animal. In a constant environment the releaser component of the instinct tends to die down, but the drive is not extinguished and may be released by a change of terrain, even in the adult, *e.g.*, on being freed after a period of confinement. Changes within an existing terrain may also act as a releaser, *e.g.*, the introduction of fresh bedding.

* At the meeting held in the Royal Veterinary College, London, April 6th, 1951.

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The Use of Films in Teaching

(H. Burrow and E. Fordham Lewis, Royal Veterinary College, Streatley)

Projection of a film showing the method of preparing carcases and offal of cattle for human consumption, together with the inspection of carcases and offal, and of the more important lymphatic glands.

The main requirements of a film for teaching purposes are:—

1. That it shall be used to supplement rather than to supplant actual experience on the part of the student.

2. That it shall possess sufficient action to maintain the interest of the viewer.

3. That the action shall be of a simple character and easy for the viewer to follow.

4. That the surroundings and equipment shall be simple and natural, and those which the student is likely to encounter every day; elaborate staging is likely to give an air of unreality to the film.

5. Reality in the eyes of the student is increased if the film is made by one of his teachers rather than by a stranger.

6. Commentary on the film probably is best given by the person or persons actively engaged in its preparation and who would, therefore, know the exact significance of each stage in the procedures shown.

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Some Observations on the Control of *Str. agalactiae* Infection

(S. J. Edwards, Agricultural Research Council, Compton)

During the last few years a certain amount of evidence has been accumulated in this country to show that infection in dairy herds due to *Str. agalactiae* can be controlled by therapeutic measures. It is the purpose of this note to draw attention to certain factors in hygiene which may contribute towards success in eradicating infection.

Following the promising results obtained in one of the Compton herds and a small-scale field experiment, a further trial was commenced in 1948 in which penicillin therapy was applied in the herds contained in a small area near the laboratory. Of 26 herds examined only ten were found infected, and of the total 817 cows tested 114 (14 per cent.) were harbouring *Str. agalactiae* in their milk. In these ten infected herds, penicillin was administered to the infected cows by injecting four daily doses of 50,000 units into each quarter. The herds were examined bacteriologically every three months and any infected cows found at six-month intervals were treated in the same way. No alteration in the current practice of milking was adopted and the experiment was purposely made as simple as possible so that its results, if successful, could be adopted on a wider scale.

The results obtained after 30 months have shown that the elimination of infection is related to the practice employed at milking, and may be summarised as follows:—

1. In five herds milked by machine without hand stripping and where udders are washed with disinfectant solution, infection has been eliminated.

2. In five herds where hand stripping or milking by hand is practised, together with little attempt at disinfection between cows, poor results have been obtained.

These results therefore confirm our earlier findings[1] and add additional evidence to the importance of methods employed at milking and notably the exclusion of hand milking.

[1] Edwards, S. J., & Taylor, J. I. (1949.) *Vet. Rec.* **61.** 780.

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Developments in the Investigation into "Bracken Poisoning" in Cattle

(E. T. Rees Evans, W. C. Evans, University College of Wales, and L. E. Hughes, Aberystwyth)

The pathognomonic symptom in bracken poisoning of cattle consists of extensive haemorrhages from the conjunctivae, nostrils, intestinal and urogenital tracts; these arise from multiple haemorrhages, varying from petechiae and ecchymoses to profuse haemorrhagic points, widely distributed in the muscular, nervous, mucosal and serous tissues. There coexists a high fever.

A study into the production of bracken poisoning in cattle, included thus, quite naturally, observations on the haematology and, in particular, the clotting properties of the blood.

The results obtained show that there exists a leucopenia, which is in the main a reflection of an agranulocytosis, a thrombocytopenia and thromboasthenia, which is reflected in a prolonged bleeding time, increased fluid volume of the clot and increased capillary fragility. The clotting and prothrombin times are normal, so are the red cell counts and characters, except in the terminal stages, and these are probably post-haemorrhagic.

These findings are one step towards the elucidation of the problem. There is reason to suspect that changes in the bone marrow are prevenient. A similar condition is commonly found in human beings in certain drug intoxications, *e.g.*, following ingestion of amidopyrine.

Future investigations will include a study into the possible bone-marrow changes and the reasons therefor. It is known that members of the B complex group of vitamins play a major part in the formation and maturation of blood cells in the marrow, and also that bracken possesses an enzyme system that destroys vitamin B_1. However, it has been shown that aneurin deficiency does not appear to assume a primary significance in the bovine problem.

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Demonstration on the Pathology of Tuberculosis in a Variety of Animals

(J. Francis, I.C.I. (Pharmaceuticals), Ltd., Wilmslow)

Photographs, microphotographs and X-rays were demonstrated, indicating some of the main features of tuberculosis in mice, guinea-pigs, rabbits, dogs, monkeys and cattle. These showed that the histological features of tuberculosis in monkeys, and to a less extent in cattle, more closely resemble those in human tuberculosis than do the histological features in other animals.

Anatomical features rather similar to those in adolescent (early post primary) phthisis can be produced in the dog. This experimental disease in the dog is usually confined to the lung and is therefore unlike natural tuberculosis in the dog.

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Further Observations on the Larval Migration of *Strongylus vulgaris*

(C. W. Ottaway (University of Bristol) and Myra L. Clarke*)

A well-known feature of the larvae of *S. vulgaris* is their association with parasitic aneurysm in the horse, although whether the aneurysms are formed in the normal course of development or, indeed, what migratory route is normally taken by this parasite are still matters of conjecture.

The theories of migration, with particular reference to intra-arterial travel, were briefly reviewed in order to focus attention on the findings of *S. vulgaris* larvae in the wall of an abdominal artery of a foal suffering from verminous thrombosis as demonstrated by lantern slides. The implications of these findings were discussed.

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The Effects of Variations in the Composition of the Air Stream in the Aeration of Cultures

(R. S. Roberts, Evans Biological Institute, Runcorn)

It is commonly assumed that the increased growth of bacteria observed when a stream of air is passed through a culture is due to an increase in the supply of oxygen.

Slides were shown as follows:—

1. A technique for the preparation of large quantities of culture by aeration.

2. A graph showing the development of the culture. (Viable counts plotted against time at hourly intervals.)

3. Modification of the apparatus for accurate observations.

4. A graph showing the course of the culture in the modified apparatus, and using ammonium sulphate instead of asparagine.

5. Table of viable counts, taken on a number of cultures at a constant time, to show that consistent reproducible results were obtained by this technique.

6. A graph showing that multiplication was suppressed when CO_2 was removed and that this suppression did not take place in a comparable culture into which some commercial CO_2 was passed. The logarithmic character of the suppressed growth was emphasised.

7. Graph showing growth curves of two cultures, one treated with nitrogen and carbon dioxide, and the other with nitrogen, oxygen and carbon dioxide. (The gases were commercial and the nitrogen contained some oxygen.)

8. Graphs showing that the effect of aeration was to cause multiplication to continue logarithmically.

9. Graph showing that when air devoid of CO_2 was passed into an actively growing culture, growth was suppressed.

These results were discussed in the light of a hypothesis that, while oxygen and carbon dioxide are necessary in the culture in small amounts, they have no function in the promotion of growth, and that the growth-promoting effect of aeration is due to removal or neutralisation of the agent which brings growth to an end.

* Work carried out whilst a member of the staff of the Royal Veterinary College.

Somatic Motor Areas of the Cerebral Cortex in the Goat

(H. Rosenberg, E. C. Amoroso, F. R. Bell and A. S. Lawn, Royal Veterinary College, London)

The cerebral cortex of the young goat has been explored under light ether anaesthesia using various types of electrical stimulation. Somatic motor responses have been obtained mainly from the anterior pole of the hemisphere. Contralateral responses were seen on stimulation of the central longitudinal gyrus anterior to the splenial sulcus. The responsive fields of the hind limb, forelimb and neck were represented from behind forwards in this order. These areas show some overlapping. On the extreme frontal pole is an area which on stimulation induces swallowing. Lateral deviation of the opposite eye is represented on the antero-medial margin of the medial longitudinal gyrus. Ipsilateral contraction of the lower lip can be evoked from the medial longitudinal gyrus.

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The Effect of Streptomycin on the Fertility of Bull Semen

(D. L. Stewart, Reading Cattle Breeding Centre, Shinfield)

Almquist (1949) showed that the addition of penicillin to semen diluents increased the fertility of the semen used in artificial insemination from certain bulls with a history of poor fertility.

At Reading this work has been followed up and streptomycin calcium chloride complex has been added to the normal semen diluent in the proportion of 1,000 microgrammes per ml. In field trials which were undertaken on a split semen sample basis, 3,547 cows were inseminated in the untreated group and 3,535 in the treated. The conception rate, calculated as the percentage of cows not returning to service within a period of 16 weeks after the first insemination, showed a highly significant increase in fertility from 57·4 per cent. to 67·5 per cent. in favour of the streptomycin treated group. The increase in fertility of the semen was observed on the first, second and third days of use and was attributable to the effect on individual bulls.

These findings are particularly interesting since this is the first change in the composition of a semen diluent, which in the experience of the Reading Cattle Breeding Centre has resulted in a significant increase in conception rate.

The effect on fertility might be due to the streptomycin (i) destroying or controlling the growth of contaminating bacteria, (ii) altering the metabolism of the spermatozoa or (iii) destroying an organism capable of affecting the fertility of the female. The first two of these suggestions seem less likely, since the beneficial effect is present from the time the semen is first used and does not increase during storage. As the effect is peculiar to individual bulls and is not altered by storage, it would appear to be due to the action of the streptomycin on a specific infective organism.

This work is still in progress.

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(*Concluded at foot of next column*)

CLINICAL COMMUNICATION

"INCLUSION CELL CONJUNCTIVITIS" IN CALVES

H. L. POOK,

Salisbury

Introduction.—The Clinical Communication by Watt (1951) on Bovine Keratitis prompts me to record the following outbreak of an infectious conjunctivitis encountered recently in this practice.

Subjects.—A batch of 54 Crossbred Friesian calves, about six months old, which were purchased in groups of ten to 15 in the open market when a few weeks old. The first batch was bought in July and the last in September, 1950, and none have been bought since.

Management.—Upon arrival at the farm calves are housed in a large barn divided into pens allowing eight or nine calves to each pen. These pens are separated by wooden boards of about 4 inches width with a 4-inch gap between them. Calves are fed individually by means of wooden yokes.

In November, when the calves were about three months old, they were moved into three large loose boxes, adjoining one another, with 16 or 17 calves in each, and one small box with five calves which had not been doing so well as the remainder.

Fresh wheat straw bedding was added to old bedding every three or four days.

Feeding was now from communal mangers and water troughs. The ration supplied was thought to be adequate and the calves were doing much better than those bought in the previous year.

The ration was as follows:—

Up to 14 days old calves are allowed 6 pints of milk each daily in four feeds. From two weeks to three weeks whole milk gradually is changed for milk powder. At three weeks a little gruel is started and this is gradually increased until, at four to five weeks, each calf is allowed two feeds per day of ½ gallon mixture 50 per cent. gruel and 50 per cent. milk powder. The percentage of milk powder is reduced by degrees until at about seven weeks 75 per cent. gruel and 25 per cent. milk powder is being fed. At about eight weeks milk powder is stopped and water is first allowed and some time between eight and nine weeks the gruel is gradually cut out.

Hay and cake are allowed *ad libitum* when the animals are from three to four weeks old; the latter consists of three parts proprietary calf nuts, two parts proprietary calf ration and one part crushed oats, to each cwt. of which is added 1½ lb. of a compound mineral mixture and 2 lb. of fish meal. At about eight weeks the calves were eating approximately a pound a day of this cake mixture.

A daily cod-liver oil supplement was provided, but this

The Electrophoresis of Serum Proteins

(A. E. Pierce, Lister Institute of Preventive Medicine, London)

The physico-chemical fractionation of bovine sera by salt and ethanol techniques was described. An account was also given of the electrophoresis apparatus, by means of which it is possible to assess the separation and the homogeneity of the different serum protein fractions prepared.

was discontinued after the end of the first week in December.

Symptoms.—One calf was found to be affected in the last week of December. A week later some 12 calves were involved. They were situated in the two end loose boxes. Calves in the central loose box were not affected. Some cases were also seen in the calves in the small detached, loose box.

The general condition of the animals was good. They did not appear to be unduly disturbed by the eye condition, and all were feeding and cudding normally. The eyes were held half closed and lachrymation was profuse.

The right eye of the calf first affected showed complete opacity of the cornea. The cornea was a bluish-white colour, protruded about $\frac{1}{8}$ inch from the eyeball and appeared to be quite insensitive to tapping with the finger. There was no sight in this eye. The remainder of the conjunctiva was very infected and inflamed. The left eye showed a bluish-white opaque area about $\frac{1}{4}$ inch in diameter, but there was no protuberance of the cornea.

The other calves all showed small opaque areas in the centre of the cornea of both eyes varying in size from pin point to $\frac{1}{8}$-inch diameter. There was profuse lachrymation in all cases. No calf was seen with lesions in one eye only and all lesions were in the centre of the cornea. Most of the calves had dust and other small particles in their eyes. This had come from very dusty hay which was being fed from racks above their heads.

Diagnosis.—Assistance in typing this infection was sought from the Veterinary Investigation Officer of the Ministry of Agriculture and Fisheries and Mr. Venn, of the Investigation Centre at Bristol, kindly visited the farm and collected samples of the lachrymal secretion. His findings are recorded in an Appendix to this paper.

Treatment.—When Mr. Venn visited the farm and the nature of the condition was realised more fully, his advice was to isolate the affected animals. As there is apparently no specific treatment for this type of infection it was suggested that it be allowed to run its course, helping things out by applications of mercurochrome or protosil ointment to the affected eyes.

This has been done, but since reading Mr. Watt's communication, treatment with 1 : 40 solution of zinc sulphate also has been tried.

Course.—The condition does not seem to have been influenced by any form of treatment and by the middle of February 33 of the calves were showing lesions in varying degrees, though none so severe as in the first affected. In this calf, eight weeks after the onset of the condition the right eye has resolved to such an extent that there is now no protuberance but the opacity remains and looks like being permanent. The left eye shows a pin point opaque area and sight is good. The remaining old cases seem to have reached a standstill, lesions remaining much the same for the last two or three weeks.

Discussion

It is difficult to decide on the possible source of infection. It would appear that there may be a carrier. It could be the irritation set up in the eye from the dust from the hay which initiated the outbreak.

It is interesting to note that of the first 25 calves affected not one was found with lesions of one eye only. On the other hand, four calves out of five in one small pen were affected—the other was unaffected. This would seem to indicate an individual susceptibility.

Unfortunately the isolation of the affected animals was never thoroughly carried out and this probably accounts for the spread of the condition to so many calves; eventually all calf pens showed cases. Response to treatment has been negligible; it would appear, therefore, that strict isolation is of more importance than any form of treatment.

This lack of response to treatment is disconcerting, but, fortunately, the final outcome does not appear to be too serious. Of 33 cases so far reported there has only been complete loss of sight of one eye and the loss of condition in the calves has been negligible.

Acknowledgments.—My thanks are due to Mr. Venn for his interest in this outbreak, for his advice and for his examination of the lachrymal secretions.

Reference

Watt, J. A. (1951.) *Vet. Rec.* **63.** 98.

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APPENDIX

LABORATORY FINDINGS

(J. A. J. Venn, Veterinary Investigation Centre, Langford)

The conjunctivae of several calves were curetted lightly and smears made from the material so obtained. Lachrymal secretions were collected at the same time.

The smears were stained, after fixing with methyl alcohol, with a weak solution of Giemsa, two drops of Giemsa per c.c. of distilled water. The stain was allowed to act for an hour, then rinsed off with absolute alcohol. The slides were then immersed in distilled water for one to two minutes, dried and examined.

Microscopical Examination.— Inclusion bodies were seen in many of the epithelial cells. These bodies stained a deep pink and were of varying shape, the majority being round; others were ovoid and others were bipolar. In certain of the round forms a ring-like staining reaction was seen. No initial bodies were seen in any of the films, nor were any extra cellular inclusion bodies observed.

These findings are identical to those reported by Blakemore (1947) and the outbreak was therefore diagnosed as one of inclusion cell conjunctivitis.

Reference

Blakemore, F. (1947.) *J. comp. Path.* **57.** 223.

STRATOSPHERE COOLING OF MEAT

The transportation of meat in specially designed cargo planes, refrigerated *en route*, is a possibility for the future and which may be developed by an American Air Line to which has been assigned the patent, registered by an American, covering a method of freezing foods by carrying in special planes flying at high altitudes in the extremely cold stratosphere. In this method, which will be tried out by the Tampa Aviation Inc., atmospheric air at high velocity will be admitted to the loading space in the aircraft through specially designed ducts from the leading edges of the wings, and it is claimed that up to 20,000 lb. of fresh meats in suitable packages can be loaded into a space 25 ft. by 7 ft. by 6 ft., and with air-blast cooling at the rate of 7,500 cubic feet per minute, could be cooled from 70° F., in a plane flying at from 15,000 to 30,000 ft. altitude, and at a speed of approximately 150 miles per hour, to minus 40° F.—*Meat Trades Journal.*

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Weekly Wisdom

Leadership is needed, and never more than in these difficult days, but the talk one often hears of "looking for a leader" is ill-judged and, indeed, dangerous. Leadership is one thing, "a leader" is another The one is the very essence of a living democracy; the other has proved again and again the very death knell of democracy. True leadership is the product of good teamwork; the 'leader" is the last resort of the herd.—Lord Tedder (Speech on installation as Chancellor of Cambridge University).

REVIEW

[**Index of Treatment.** By HAMILTON KIRK, M.R.C.V.S. Second Edition, 1951. Pp. x + 826, with 177 figs. Published by Baillière, Tindall & Cox, 7 & 8, Henrietta Street, London, W.C.2. Price 40s. net.]

We were able to extend a cordial welcome to the first edition of this book, a welcome which was undoubtedly justified since a new edition has been called for so soon and is now available. In the light of the very difficult conditions under which the first edition was produced we touched but lightly upon the omission of certain very recent advances in treatment. However, in the preface to the second edition the author states, ". . . so that for the second edition a very complete revision has been imperative, as a result of which I believe the finished work to be completely up to date"; such a statement justifies our more critical review of the new edition.

With the exception of the considerable extension to the section devoted to treatment of fractures and the addition of a classified list of hormone preparations to the appropriate chapter, the text has been subject in the main to only minor alteration. We feel that the part of the chemotherapy section devoted to the sulphonamides might well have been re-cast; it remains basically the same as in the previous edition with the greatest emphasis on what are now substances of virtually historic interest such as prontosil; no mention is made of the use of combined sulphonamides such as "Sulphatriad," substances which have sound pharmacological claims to commend them. The table of blood concentrations of the various sulpha drugs on page 33, one taken from medical literature, might well have been replaced by an approximation to that in Milk's "Veterinary Pharmacology"; it would have been far more useful to the veterinary reader.

Penicillin receives brief mention in this chapter but is mainly considered under the heading of Antiseptics. Would not a chapter devoted to antibiotics have been justified? The newer antibiotics are mentioned only in small type and the author seems somewhat muddled over the question of availability of streptomycin and chloromycetin; contrary to his implication, streptomycin has been freely available for some time whereas chloromycetin has only very recently become generally available on *medical* prescription.

Other omissions we noted are: "Trilene" receives no mention under Anaesthetics; vitamin B_{12} does not appear in the treatment of anaemia; gold therapy for arthritis is not noted, nor the possible use of quinidine for cases of tachycardia.

In the treatment of dystokia the use of forceps is apparently only to be recommended to crush large foetal heads; the use of light forceps to deliver living undamaged foetuses, which is becoming routine in many practices, is ignored.

"Hard-Pad" disease, under the heading of Encephalitis, receives notice in the new edition, but surprisingly enough the use of canine distemper vaccine and virus in the treatment thereof is not mentioned.

The antihistamine drugs likewise receive brief notice, but very wisely the author does not join the ranks of those with antihistamine mania and his reference to their use is commendably moderate at this juncture.

Much new material is added to the section on fracture treatment and the author admits what is already known in many modern surgeries, that the new methods of osteosynthesis are not beyond the scope of the private practitioner. Unfortunately introduction of the intramedullary pin from the fracture site in femur fractures is not mentioned.

We would add that what was said of the first edition remains true now, and those who have not yet a copy of this work should certainly obtain one of this new edition. Perhaps the high hopes we had on opening it were based on the excellence of its predecessor and our disappointment is the greater after reading the author's preface to his newest work, in which surely he would have been well advised to substitute for the bold claim we have quoted, a reference to the fact that, owing to the difficulties in production common to all publishers, the issue of his book has been seriously delayed. Maybe the ever-increasing tempo of recent advances in every type of therapeutic measure is too great to enable any single person to keep abreast of it, but the author has made a brave endeavour even if he has not succeeded in every instance.

ABSTRACTS

[**Preliminary Studies on the Effect of Streptomycin and Other Agents on** *Mycobacterium paratuberculosis*. LARSEN, A. B., VARDAMAN, T. H., & GROTH, A. H. (1950) *Canad. J. vet. Res.* **11.** 374–377.]

In an attempt to make progress in the chemotherapy of Johne's disease some experiments were carried out with some fairly new drugs which have given good results in tuberculosis or other diseases.

Studies were first made *in vitro*, in which fresh cultures of *M. paratuberculosis* were exposed to the action of the selected compounds for a few weeks. Nine serial concentrations were used, starting at 0·5 μg. per c.c. Only streptomycin showed an effective inhibitory action at reasonably low concentration, having regard to clinical possibilities. Promin, stilbamidine, pentamidine and 4-amino-salicylic acid were not usefully active.

Two heifers and two cows with advanced Johne's disease were treated with streptomycin in dosages varying from 2 to 6 grammes per 100 lb. bodyweight, given by divided six-hourly doses over periods of 24 to 60 hours. There was slight to marked clinical improvement in all cases, but in each case early relapse and death from acute Johne's disease. Blood from one of the animals was shown to contain streptomycin in inhibitory concentration against the specific organism in culture.

These results are not regarded as very encouraging.

J. E.

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[**Streptomycin in the Treatment of Actinomycosis.** KINGMAN, H. E., & PALEN, J. F. (1951.) *J. Amer. vet. med. Ass.* **118.** 28–30.]

Ten cases of actinomycosis of the mandible in cattle were treated by injections of streptomycin. Six of the cases were chronic and the rest less than three months old and *Actinomyces bovis* was isolated from four of them. The streptomycin was given in doses of 5 grammes in water, the dose being distributed around the swelling. This treatment was given on three consecutive days and again later in accordance with the progress of the case. Surgical treatment was also given to seven of the cases and potassium iodide to five.

As the disease was arrested in all but one case, this method of treatment is regarded as very promising.

J. E.

In a message from Nicosia, Cyprus, on June 2nd, Reuter's correspondent reports that 78 young monkeys and 153 birds were found dead at the airport there in a Skymaster which was flying them from Bangkok to Amsterdam. They were intended for zoos in different parts of the world.

QUESTIONS IN PARLIAMENT

Dogs (Sheep Worrying)

Mr. Hurd (June 21st) asked the Secretary of State for the Home Department how many cases of sheep worrying by dogs have been proved before magistrates' courts in the past year; and in how many instances the magistrates have admonished the owners without ordering the dogs to be destroyed.

Mr. Ede: I regret that this information is not available.

Mr. Hurd: As the worrying of sheep by dogs has become such a serious menace in many districts, will the right hon. Gentleman see if it is possible to provide these figures so that we may know whether there has been an improvement or whether the position is deteriorating?

Mr. Ede: I hope that the publicity of this Question and answer will attract the attention of magistrates to the public interest in the matter.

Earl Winterton: Is the right hon. Gentleman aware that there have been a number of other Questions on this subject in which attention has been called to the great damage caused to the farming community and the intense cruelty occasioned to the sheep, but that nothing has happened? There has been an astonishing absence of any statement by any of the so-called animal protection societies, who are apparently more concerned with the interests of the dogs than the poor tortured sheep. Will he circularise magistrates on the subject?

Mr. Ede: I do not think that a circular would have any marked effect. I can only hope that any magistrates who may have been reluctant to do their duty in the past will notice the opinions expressed in the House.

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Horses and Cattle (Transport from Ireland)

Mr. Peter Freeman (June 21st) asked the Minister of Agriculture whether he has now a report to make on the steps he is taking to ensure improved conditions for the transport of horses and cattle from Eire.

Mr. T. Williams: I would refer my hon. Friend to the answer I gave on June 14th to the hon. and gallant Member for Ayr (Sir T. Moore).

Mr. Freeman: Can my right hon. Friend say when he will be able to announce a decision?

Mr. Williams: My hon. Friend has already been made aware that we have communicated with the Southern Ireland Parliament, the Northern Ireland Parliament, the Ministry of Transport and the Chamber of Shipping seeking their advice on the regulations he has in mind.

Sir Ralph Glyn: Will the right hon. Gentleman bear in mind that there is a considerable trade now in importing donkeys for food in this country and that the conditions under which they are transported are deplorable?

Mr. Williams: I have not heard of that.

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Police (Animal Protection)

Mr. Peter Freeman (June 21st) asked the Secretary of State for the Home Department whether he will facilitate the formation of a council of police officials for the protection of animals, such as that which is in operation in Holland and has been widely appreciated by the judiciary and chiefs of police there, and details of which have been sent him.

Mr. Ede: I have read with interest the document which my hon. Friend was good enough to send me, but I do not think that a council of police officers on the lines suggested would be appropriate to conditions in this country.

Mr. Arthur Colegate: Does not the Home Secretary agree that the work done by the Royal Society for the Prevention of Cruelty to Animals in conjunction with the police provides adequate protection?

Mr. Ede: The liaison between police officers and the members of that Society makes for the proper administration of the law.

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Dartmoor Ponies (Preservation)

Mr. Renton (June 21st) asked the Minister of Agriculture whether he is aware that the famous and hardy breed of Dartmoor pony is fast becoming extinct as a pure breed, through horses and ponies of other breeds being allowed on to Dartmoor; and what steps he will take to ensure the preservation of the breed of Dartmoor ponies in the wild state.

Mr. T. Williams: I am aware that some inter-breeding of Dartmoor ponies with ponies of other breeds is occurring among animals living on Dartmoor, but I have no powers that would enable me to prohibit owners of horses or ponies of such other breeds from allowing their animals to be on the moor, nor do I think it necessary to seek such powers.

NOTES AND NEWS

Diary of Events

Ju'y 6th.—Meeting of North of England V.M.A. at Darlington (Darlington Auction Mart), 3 p.m.

July 11th.—Annual General Meeting of Association of Veterinary Teachers and Research Workers (Northern Region) at "Leahurst," Neston, Wirral, 2.30 p.m.

July 13th.—Society of Practising Veterinary Surgeons, Meeting of Council, Royal (Dick) Veterinary College.

Sept. 23rd-29th.—Sixty-ninth Annual General Meeting and Congress of the National Veterinary Medical Association, at Eastbourne.

N.V.M.A. Meetings in Edinburgh

Wednesday, July 11th:
11 a.m. Home Appointments Committee.
2 p.m Organising Committee.
4 p.m. Parliamentary and Public Relations Committee.

Thursday, July 12th:
11 a.m. Veterinary State Medicine Committee.
2 p.m. General Purposes and Finance Committee.

Friday, July 13th:
11 a.m. Council.

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PERSONAL

Appointments.—The following first appointments in the Colonial Veterinary Service are announced: Mr. J. F. Cowie, M.R.C.V.S., as Veterinary Officer, Uganda, and Mr. R. G. Erskine, M.R.C.V.S., as Veterinary Officer, Nigeria.

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Births.—Henderson.—On June 18th, 1951, to Mary (*née* Hawkins), wife of John F. Henderson, a son—Richard.

Hunnam.—On June 20th, 1951, to Sallie (*née* Thorne), wife of Robert Hunnam, B.V.Sc., M.R.C.V.S., 22, Ferrers Road, Lewes, Sussex, a son—Richard Cedric.

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N.V.M.A. EASTBOURNE CONGRESS

We omitted to indicate in publishing a revised provisional programme in our last issue, that the demonstrations on Small-animal Surgery, including X-rays, to be given on Tuesday, September 25th, were being organised by Mr. Gordon C. Knight, F.R.C.V.S., of the Royal Veterinary College, London. Mr. Knight has taken charge of these arrangements at the request of the Provisional Committee, and further details will be published later.

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"AT HOME"

Mrs. A. G. Heveningham was "At Home" to officers of the Royal Army Veterinary Corps and ladies on Friday afternoon, June 8th, at the Junior Army and Navy Club, London; the following were present:—

Mrs. J. J. Aitken, Colonel and Mrs. G. Barnett, Lieut.-Colonel J. Clabby, Lieutenant and Mrs. J. Cowie-Whitney, Lieut.-Colonel B. C. M. Edmonds, Major and Mrs. J. Going, Lieut.-Colonel D. A. Green, Captain W. Harris, Brigadier A. G. Heveningham, Lieut.-Colonel and Mrs. J. Hickman, Brigadier and Mrs. G. A. Kelly, Miss J. Kelly, Lieut.-Colonel and Mrs. J. A. Langley, Major T. Lishman, Co'onel and Mrs. J. J. Mills, Captain and Mrs. P. Mitchell, Brigadier and Mrs. C. A. Murray, Brigadier E. S. W. Peatt, Brigadier J. J. Plunkett, Lieut.-Colonel and Mrs. A. G. Ralston, Lieut.-Colonel and Mrs. W. M. Rouse, Colonel and Mrs. W. L. Sinton, Lieut.-Colonel and Mrs. D. F. G. Smith, Lieut.-Colonel D. I. C. Tennant, Colonel R. G. Thomson, Colonel E. G. Turner, Colonel W. H. Walker, Lieut.-Colonel and Mrs. G. F. Watkins, Major and Mrs. J. H. Wilkins, Lieut.-Colonel and Mrs. H. B. Williams, Major and Mrs. J. E. Wood, Mrs. P. F. Woodland.

This happy gathering, the fifth since the war, was greatly enjoyed by all present.

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There are 30,000,000 more sheep in the world now than there were this time last year. The Australian Wool Board says sheep flocks are on the increase all over the world, and they estimate the world sheep population at 762,000,000 head. The reason for the increase, said the Board, was the high prices being paid for wool.—*Reuter.*

Licensing of Employees of Animal Welfare Societies

In view of the enquiries we have had regarding the exact position, scope and functions of Licensees, we reproduce below the relevant portion of the newly issued "Guide to Professional Conduct" for veterinary surgeons.

"A licence to an employee of an animal welfare society can only be issued by the Minister of Agriculture and Fisheries where

(*a*) The society is wholly supported by voluntary contributions or endowments.

(*b*) The society provides, and was immediately before the coming into operation of the Veterinary Surgeons Act (July 30th, 1948) providing, free medical or surgical treatment to animals.

(*c*) The Minister is satisfied that the society concerned cannot obtain the services of an adequate number of veterinary surgeons.

(*d*) The society undertakes to employ a person, to whom a licence has been granted, only in giving such treatment or operations as he may be allowed to perform to a domestic or draught animal whose owner appears to be unable to afford the services of a veterinary surgeon."

"A person to whom a licence is granted is

(*a*) Only allowed to give any medical treatment or for the relief of pain, to perform any superficial operations which do not involve amputation of a limb or incision into the body cavities or incision into or removal of any organ.

(*b*) Only allowed to give such treatment or operations:—

(i) Without any charge.

(ii) To domestic and draught animals of the poor."

"The Minister of Agriculture and Fisheries may revoke or suspend a licence if it appears to the Minister:—

(*a*) That the society is no longer wholly supported by voluntary contributions or endowments or both, or

(*b*) That the society has acted in contravention of the undertaking given by it not to employ the licensee in treating or operating on any animal unless its owner appears to be unable to afford the services of a veterinary surgeon, or

(*c*) That the licensee has failed to comply with any condition subject to which the licence is granted, or

(*d*) That the licensee has, either before or after the grant of the licence, been convicted of an offence under the Veterinary Surgeons Act, 1948, the Dangerous Drugs Acts, 1920 to 1932, the Pharmacy and Poisons Act, 1933, Part II of the Diseases of Animals Act, 1935, or the Penicillin Act, 1947, or of any offence involving cruelty to or neglect of animals."

"It is emphasised that the intention of the Act is that the work of animal welfare societies which come within the provisions of Section 7 of the Act shall be carried on until such time as sufficient veterinary surgeons are available to carry out all the veterinary work of the society; in other words, the intention is that in the future there shall be a time when no more licences shall be issued."

"A person to whom a licence is issued is not entitled in law to practise veterinary surgery to any greater degree than is allowed by the terms of his licence. A practitioner must not assist or enable any such person to carry out any treatment or perform any operation which may be in contravention of the Act or of the terms of the licence."

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Dairy Conference at the Priory, Thurgarton

A conference on Dairy Farming attended by veterinarians, farmers and agricultural scientists was organised by Boots Pure Drug Co., Ltd., at their Veterinary Research Station, Thurgarton, Notts, on April 13th and 14th last. The principal speakers at the four sessions were Dr. K. L. Turk, Professor of Animal Husbandry, Cornell University, Dr. C. S. M. Hopkirk (New Zealand), Dr. J. Hammond (Cambridge) and Professor H. G. Robinson (Nottingham).

On the morning of April 13th, Mr. W. R. Norman welcomed the members on behalf of Boots Pure Drug Co., Ltd., and asked Sir James Scott-Watson to occupy the chair for the first session at which Professor K. L. Turk gave an address on "Reasonable Objectives in Dairy Farming." Drawing mainly on American experience, he discussed what were the possible means of improving the efficiency of dairy farming.

In the second session, Dr. C. S. M. Hopkirk addressed the conference on "Recent Advances in the Maintenance of the Health of Dairy Stock." Dr. Hopkirk's paper covered a very wide field of subjects, including infertility, A.I., mastitis, Brucella vaccination, nutritional disease, parasitism and use of identical twins.

In regard to infertility, Dr. Hopkirk pointed out that, largely through the use of S.19 vaccine, contagious abortion had ceased to be a major cause of sterility, though now, infections with *Trichomonas* and *Vibrio foetus*, particularly the latter are of increasing importance. Dealing with non-specific infertility, Dr. Hopkirk mentioned that this is often said to be due to hormone imbalance. Discussing recent theories of a nutritional cause for this imbalance, Dr. Hopkirk said that, while it is not yet proven that increasing the amount of P in relation to Ca would improve production and maintain hormone balance, there is sufficient circumstantial evidence to suggest that the wise dairy farmer will endeavour to avoid an excess of $CaCO_3$ in his mineral mixtures and ensure an adequate supply of P. Iodine is also necessary and an excess of P can interfere with its utilisation.

In talking of A.I., Dr. Hopkirk quoted work in New Zealand which suggests that a tendency to mastitis may run in families and he suggested that in choosing bulls for A.I. centres, the health background of the dams for several generations back should be examined.

Reviewing recent work on mastitis, Dr. Hopkirk pointed out that penicillin has removed much of the loss due to the *Str. agalactiae* type, but the possibility of strains becoming drug fast must be borne in mind and it must also be realised that the removal of one type may open the way for others. Dr. Hopkirk then went on to discuss possible predisposing causes and suggested that perhaps too little attention had been paid to this side of the disease. He pointed out that organisms may be present in the udder for several months with no visible changes in the milk until some sudden change such as a cold night, wet fields, oestrum or digestive disturbance occurs and clinical cases appear.

After referring briefly to improvements in foot-and-mouth disease and rinderpest vaccines, Dr. Hopkirk passed on to the subject of nutritional diseases. Though it is rapidly becoming a thing of the past to see animals dying of trace element deficiency, little is known of the physiology of these substances; however, recent work on the relation of cobalt to vitamin B_{12}, APF and the ruminal flora gives a lead.

The group of diseases including milk fever, grass tetany and acetonaemia is not yielding very rapidly to research, though to some extent practical cures are known. Dr. Hopkirk pointed out that grass tetany is more than simple hypomagnesaemia, as cows may show a low blood magnesium for a considerable time without any symptoms. In regard to acetonaemia, he mentioned that recent work suggests that this may be carbohydrate starvation. If the bodyweight of animals in good condition is lowered rapidly, hypomagnesaemia, grass tetany and ketosis follow. Dr. Hopkirk pointed out that in animals in good condition it is essential to maintain or increase the level of nutrition, particularly carbohydrates, at calving, if loss of weight and ketosis are to be avoided. Anything tending to lower food intake is dangerous. In regard to bloat, little is yet known of the actiology, though for the present the best working hypothesis is that there is some toxic metabolite in quickly growing pastures.

Dr. Hopkirk stressed the importance of using identical twins for comparative nutrition experiments in cattle.

In discussing parasitism stress was laid on the importance of nutritional factors and mention was also made of the danger of photosensitisation in young cattle following dosing wih phenothiazine.

The discussion was opened by Dr. W. R. Wooldridge. He discussed the subject in general terms and emphasised the necessity of a "dynamic" approach to animal disease in which the interrelation of host, invading organism, and nutritional and physiological factors are all considered. He elaborated and pointed out the dangers of upsetting the physiological balance of an animal by undue emphasis on any one organ. In discussing the nutritional side of the matter, Dr. Wooldridge mentioned recent work on vitamins and antivitamins, which showed that in terms of molecular structure there was a gradual change from an essential food factor to an antibiotic. He closed by stressing the fact that, in studying disease, not one but many chemical changes are occurring.

Mr. D. L. Hughes, in his opening remarks, stressed the importance of health maintenance, which he defined as the absence of disease plus the ability to produce in an economically sound environment. Mr. Hughes pointed out that in this country the major epizootics have been conquered and that the time has come to tackle the chronic insidious infections such as tuberculosis and Johne's disease. Contagious abortion and mastitis are no longer as serious a menace as they were, due in the one case to vaccination and in the latter to a sounder appreciation of hygiene and the use of antibiotics. Mr. Hughes also pointed out that there was little hope of a disease-free dairy Utopia, as the solving of one set of problems is likely to uncover others. In the last 15 years the pharmaceutical industry has provided an impressive list of agents for disease control, but this is no excuse to sit by with folded hands; the search for new and better drugs must continue.

In Mr. Hughes' opinion the contribution of bacteriology to future advances will probably be of secondary importance as the movement into the "metabolic era" will leave the future more to the physiologist and biochemist.

The following members of the profession, Dr. Stableforth, Mr. J. W. Bruford and Mr. A. J. Wright, took part in a lively discussion which followed the opening speeches, the topics provoking most interest being infertility, metabolic diseases, the use of S.19 vaccine and the possibility of strains of organisms becoming resistant to antibiotics.

In the third session Professor H. G. Robinson gave a lucid talk on "The Economics of Dairy Farming," which covered a large amount of ground and stressed the importance of the economic production of milk at a price the consumer can afford.

In the course of the discussion Mr. Hanson, of New Zealand, described some of his work with identical twins.

The fourth and last session commenced with a paper by Dr. J. Hammond on "Some Factors Affecting the Breeding of Dairy Cows." Dr. Hammond emphasised the importance of "grading up" cows by the use of good bulls rather than by "culling" (except for disease). It was his opinion that the best way of doing this was by means of A.I. and he discussed means of ensuring the selection of suitable bulls.

The discussion covered many aspects of breeding and husbandry.

In summing up the conference, Professor Turk stressed the usefulness of such meetings as affording opportunity for the presentation of many points of view on the one problem.

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NATIONAL POULTRY INSTITUTE SCHEME

New Arrangements

Between 1920 and 1939, says a recent announcement by the Ministry of Agriculture, valuable work in poultry research, experiment and education was carried out under this Scheme by the National Poultry Institute Advisory Committee, the Northern and Southern Sub-committees and the National Institute of Poultry Husbandry.

Consultations between the Ministry and the National Farmers' Union, who took over the responsibilities of the former National Poultry Council in this matter, have resulted in agreement that this Scheme has fulfilled its purpose and that the continuing work in poultry research, experiment and education could most suitably be provided for under other arrangements. These have now been completed and are as follows.

The National Institute of Poultry Husbandry has become an integral part of Harper Adams Agricultural College, the largest centre for Diploma teaching in poultry husbandry in England and Wales and a leading centre of experimental work. The staff and equipment (which has been extensively renewed) remain at the College and the work continues to be directed under the Principal, Mr. W. T. Price, M.C., by Mr. H. Howes, as Head of the Poultry Department, and Dr. H. Temperton. Appropriate financial arrangements have been agreed between the Ministry and the College. Some part of the original cost of the Scheme was contributed by the poultry industry which will continue to be associated with the work through the nomination by the Minister of Agriculture of a leading figure in the industry as one of his two nominees on the Governing Body of Harper Adams Agricultural College. Mr. G. R. H. Nugent, M.P., has been appointed to hold this position for the present.

The work previously sponsored by the N.P.I. Scheme at the Animal Nutrition Research Institute, Cambridge, continues under the direction of the University Authorities and is supervised by the Agricultural Research Council. The N.P.I. Scheme was responsible for some notable contributions in the advancement of poultry science and poultry genetics, including the breeding work at Cambridge under Professor R. L. Punnett, F.R.S., who introduced the sex-linked method of breeding cross-bred pullets and later, with the collaboration of Mr. M. S. Pease, produced the new pure-breeding Cambridge varieties of poultry and discovered sex-linkage in ducks.

At Reaseheath the Northern Sub-committee of the N.P.I., under the direction of its Vice-Chairman, Mr. Pease, of Cambridge University, has carried out important experiments vital to the understanding of in-breeding and hybrid vigour. The Sub-committee has also supervised poultry research work directed by its Vice-Chairman and carried out at the Cheshire School of Agriculture. Steps are being taken to develop and expand the Reaseheath work at or near Cambridge. In poultry nutrition Mr. E. T. Halnan successfully established the feeding standards for poultry under British conditions; results were incorporated in the Ministry's Bulletin No. 7, now recognised as a standard work by practical breeders both here and abroad. This basic knowledge coupled with experiments at Cambridge and Wye contributed materially to the success of the scheme for the rationing of poultry feeding-stuffs introduced during the war.

The work on diagnosis of poultry diseases and other research at the Ministry of Agriculture's Veterinary Laboratory at Weybridge continues as part of the programme of that centre. Preparations are being made to carry out certain experimental work with poultry at two or three of the Experimental Husbandry Farms of the National Agricultural Advisory Service.

The Southern Sub-committee of the N.P.I. Scheme, which was concerned with the table poultry investigations at Wye College, ceased activities when war came in 1939.

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LEGAL NOTES

Failure to Notify Foot-and-Mouth Disease.—A case arising from a series of outbreaks of foot-and-mouth disease in the West Riding was heard at Otley on May 25th when Alan Binns, farmer, of Woodland Farm, Rawdon, was fined £30 with £9 12s. 8d. costs for failing to notify that an animal in his possession was affected with the disease. He was also fined £20 for failing to keep records of movements of animals.

Supt. Elkins said the prosecution viewed the failure to notify the disease with some seriousness. He suggested that the disease in the defendant's stock should have been apparent to anyone looking after the animals.

Mr. F. H. Addison, Veterinary Inspector of the Ministry of Agriculture, said he visited defendant's farm on January 24th, and while he was still some distance from the cattle it was obvious there was something seriously wrong. He estimated that a cow had had the disease for over four days, and that some pigs had had it about four days.

Defendant said he had had no idea there was any disease on his farm, and when, on conviction, he commented that the penalty imposed was "rather heavy," the Chairman (Mr. R. T. A. Renton) said "it was a very heavy affair for the whole country."

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VETERINARY INVESTIGATION SERVICE

Setting up of New Area

The Veterinary Investigation Service of the Ministry of Agriculture and Fisheries has recently announced the making of a new area to be based at Weybridge. The V.I.O. in charge will be Mr. A. Shand, M.R.C.V.S., who will be responsible for Surrey, West Sussex, Hampshire and Dorset: his assistant will be Mr. P. D. Thomson, M.R.C.V.S. The object of this new area is to reduce the size and unwieldly nature of the Reading province and it is hoped that the new arrangements will enable the Service to give more adequate assistance to veterinary surgeons in both the old and the new areas.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Swine Fever:

Denbigh.—Off Licence, High Street, Gwersyllt (June 22nd).

Derby.—29, Nesbitt Street, Hillstown (June 19th); Winster Cottage, Kirk Ireton, Wirksworth (June 20th).

Durham.—Hospital Farm, Shotley Bridge, Hospital, Shotley Bridge, Durham (June 18th); Thornhill Farm, Tunstall Road, Sunderland (June 23rd).

Herts.—White Lodge Farm, Bell Bar, Hatfield (June 20th).

Isle of Ely.—Swan Bridge Farm, Parsons Drove, Wisbech; Hundred Acre Farm, Harold Bridge, Gorefield, Wisbech (June 18th); Elm Grove Farm, Fodder Fen, Manea (June 19th); Piggeries at Creek Road, March (June 22nd).

Kent.—Monks Hill Farm, Herne Hill, Faversham (June 19th).

Lancs.—Manor Farm, Singleton, Blackpool (June 22nd).

Lincs (Lindsey).—Eastgarth, Ludford, Lincoln (June 20th).

Moray.—Bilbo Hall Farm, Elgin (June 19th).

Norfolk.—Clippesby Hall, Clippesby, Yarmouth (June 19th); The Bakery, Church Terrace, Outwell, Wisbech (June 20th).

Notts.—238, Main Street, Nottingham (June 22nd); The Farm House, Thoroton, Newark (June 23rd).

Staffs.—Warren House Farm, Darlaston, Stone (June 18th).

Stirling.—Southmuir Farm, Reddingmuirhead (June 18th).

Warwick.—Nineveh Farm, Whatcote, Shipston-on-Stour (June 22nd).

Yorks (E.R.).—Starr Carr Field, Brandesburton (June 18th).

Yorks (W.R.).—Manor Farm, Adel, Leeds 6 (June 18th); Brandon Hall Farm, Shadwell, Leeds; Friars Hill, Owler Park Road, Myddleston, Ilkley (June 23rd).